

## CLAIMS

[1] A magnesium-based alloy screw wherein tensile strength is 220 MPa or higher.

[2] The magnesium-based alloy screw according to claim 1, wherein the magnesium-based alloy contains Al: 0.1 to 12% by mass.

[3] The magnesium-based alloy screw according to claim 2, wherein the magnesium-based alloy contains one or more of Mn: 0.1 to 2.0% by mass, Zn: 0.1 to 5.0% by mass and Si: 0.1 to 5.0% by mass.

[4] The magnesium-based alloy screw according to claim 1, wherein the magnesium-based alloy contains Zn: 0.1 to 10% by mass and Zr: 0.1 to 2.0% by mass.

[5] The magnesium-based alloy screw according to claim 1, wherein the magnesium-based alloy contains rare-earth element: 5.0% by mass or less.

[6] A producing method of a magnesium-based alloy screw comprising

a head forging step in which a head working for forming a head portion of a screw on a wire made of magnesium-based alloy obtained by drawing is carried out by warm working to produce a screw blank, and

a thread rolling step in which thread rolling for forming screw thread on the screw blank is carried out by warm working to produce a screw, wherein

the head working in the head forging step is carried out using holding die which fixes the wire and a punch which forms a head portion of the screw, the holding die and the punch are heated, in which at least the holding die is heated to 140°C or higher and 250°C or lower, thereby heating the wire to 140°C or higher and lower than 250°C.

[7] The producing method of a magnesium-based alloy screw according to claim 6, wherein the holding die and the punch are respectively fixed to a die holder and a punch holder respectively including a heating means, the holding die and the punch are heated by the heating means,

at least a portion of an outer periphery of the holder is provided with a heat insulator, a heated state of the holding die and punch is maintained by the heat insulator.

[8] The producing method of a magnesium-based alloy screw according to claim 6, wherein the following steps are continuously carried out:

a supplying step for supplying to cutting means a base wire made of magnesium-based alloy obtained by drawing,

a cutting step for cutting the supplied base wire into pieces each having a constant length by the cutting means, thereby obtaining a wire as a work piece,

a transferring step for transferring the cut wire to forging means, and

a head forging step for forming a head portion of a screw

on the transferred wire.

[9] The producing method of a magnesium-based alloy screw according to claim 8, wherein

the cutting means includes cutting die which hold the wire,  
the holding die is fixed to a die holder including a heating means which can heat, the holding die is heated by the heating means,

the cutting die is fixed to the die holder of the holding die,

the cutting step is carried out in such a manner that the wire is held by the cutting die, the cutting die is heated by the heating means of the die holder, thereby heating the wire.

[10] The producing method of a magnesium-based alloy screw according to claim 9, wherein in the cutting step, the wire is heated both by a wire heating means for directly heating the wire and by the cutting die which is heated by the heating means of the die holder,

and the cutting die cuts the heated wire.

[11] The producing method of a magnesium-based alloy screw according to claim 6, wherein working speed of the head working is 100 mm/sec or higher.

[12] The producing method of a magnesium-based alloy screw according to claim 6, wherein the thread rolling is carried out using thread rolling die,

the thread rolling die is heated to 100°C or higher and

lower than 250°C, thereby carrying out the thread rolling.

[13] The producing method of a magnesium-based alloy screw according to claim 12, wherein the thread rolling die include a heating means capable of heating the thread rolling die, the thread rolling die is heated by the heating means, a heat insulator is disposed such as to surround an outer periphery of the thread rolling die, and a heated state of the die is maintained by the heat insulator.

[14] The producing method of a magnesium-based alloy screw according to claim 12, further comprising a step in which moving means moves the screw blank obtained in the head forging step to the thread rolling die, the moving means is heated to 100°C or higher and lower than 250°C.

[15] The producing method of a magnesium-based alloy screw according to claim 6, further comprising a thermal treatment step in which a screw subjected to the thread rolling is subjected to thermal treatment at 100°C or higher and lower than 350°C.

[16] The producing method of a magnesium-based alloy screw according to any one of claims 6 to 15, wherein average crystal grain diameter of the magnesium-based alloy is 10  $\mu\text{m}$  or less, and maximum crystal grain diameter thereof is 15  $\mu\text{m}$  or less.

[17] The producing method of a magnesium-based alloy screw according to any one of claims 6 to 16, wherein the magnesium-based alloy contains Al: 0.1 to 12% by mass.

[18] The producing method of a magnesium-based alloy screw

according to claim 17, wherein the magnesium-based alloy contains one or more of Mn: 0.1 to 2.0% by mass, Zn: 0.1 to 5.0% by mass and Si: 0.1 to 5.0% by mass.

[19] The producing method of a magnesium-based alloy screw according to any one of claims 6 to 16, wherein the magnesium-based alloy contains Zn: 0.1 to 10% by mass and Zr: 0.1 to 2.0% by mass.

[20] The producing method of a magnesium-based alloy screw according to any one of claims 6 to 16, wherein the magnesium-based alloy contains rare-earth element: 5.0% by mass or less.